Independent Assessment of Emergency Management at the Idaho National Laboratory

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Office of Enterprise Assessments
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Acronyms

AAR	After-action Report
BEA	Battelle Energy Alliance, LLC
BED	Building Emergency Director
CFA	Central Facilities Area
DEQ	Idaho Department of Environmental Quality
DOE	U.S. Department of Energy
DOE-ID	Idaho Operations Office
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
EAM	Emergency Action Manager
ECC	Emergency Control Center
ED	Emergency Director
EOC	Emergency Operations Center
EOS	Emergency Operations System
EPHA	Emergency Planning Hazards Assessment
ERG	Emergency Response Guidebook
ERO	Emergency Response Organization
FAEDC	Fire Alarm and Emergency Dispatch Center
IC	Incident Commander
ICP	Incident Command Post
INL	Idaho National Laboratory
JIC	Joint Information Center
KI	Potassium Iodide
MFC	Materials and Fuels Complex
NARAC	National Atmospheric Release Advisory Center
OFI	Opportunity for Improvement
PA	Protective Action
PAC	Protective Action Criteria
RadCon	Radiological Controls
SAE	Site Area Emergency
SD	Support Director
SMT	Site Monitoring Team
TIA	Timely Initial Assessment
WCC	Warning Communication Center

INDEPENDENT ASSESSMENT OF EMERGENCY MANAGEMENT AT THE IDAHO NATIONAL LABORATORY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment to appraise emergency management program effectiveness at the Idaho National Laboratory (INL) during its annual site-level exercise conducted on October 12, 2021. The appraisal evaluated the effectiveness of both Battelle Energy Alliance, LLC (BEA) and DOE Idaho Operations Office (DOE-ID) in managing and maintaining emergency response organization (ERO) performance during the site-level exercise, as required by DOE Order 151.1D, *Comprehensive Emergency Management System*. Additionally, EA appraised the performance of the ERO at key decision-making venues to determine whether BEA responded effectively to an operational emergency and whether appropriate response measures were taken to protect workers, responders, and the public.

EA identified the following strength:

- The BEA emergency action manager at the Materials and Fuels Complex followed established procedures to promptly classify the incident as a Site Area Emergency and implemented protective actions (PAs) associated with the emergency actions levels.

EA also identified several weaknesses in the INL emergency management program, including two findings that warrant a high level of attention from BEA and DOE-ID management:

- The predetermined PAs for both emergency action levels selected by BEA during the exercise were not conservative. In addition, decision-making during the exercise would have unnecessarily exposed employees to potential radiological hazards if the controllers had not stopped the decision from being executed.
- BEA did not demonstrate effective communications, which negatively affected situational awareness and a common operating picture. Additionally, BEA did not provide field workers timely notification of PAs to ensure their safety and did not perform initial written notifications to INL facilities and offsite agencies, or the initial verbal notification to DOE Headquarters.
- While the BEA planning team's consequence assessment activities provided a conservative initial assessment and ongoing supportive assessments throughout the emergency, some modeling errors occurred, and most notably, not sharing information with affected EROs significantly diminished situational awareness and contributed to inappropriate decisions.
- BEA did not demonstrate an effective emergency operations system that validates and coordinates incident information to establish and maintain situational awareness and a common operating picture among response components. (Finding)
- BEA did not demonstrate a reliable and effective information management system to support emergency response operations. (Finding)
- Additionally, EA identified concerns regarding exercise design, conduct, and evaluation. Most notably, the exercise was marginally challenging, and player hotwashes and the evaluator debriefing held following the exercise did not identify some performance issues.

In summary, BEA generally used appropriate plans and procedures to facilitate emergency response actions. BEA used procedures to promptly classify the incident as a Site Area Emergency. However, BEA and DOE-ID demonstrated performance weaknesses during the exercise in several areas, including selecting non-conservative PAs, making decisions that would unnecessarily expose workers to potential radiological hazards, not demonstrating effective communications, not providing timely notifications of

PAs to field workers, not performing required initial written and verbal notifications, and not sharing consequence assessment results with affected ERO organizations. Most significantly, BEA did not demonstrate an effective emergency operations system and did not demonstrate a reliable and effective information management system. Additionally, EA identified concerns regarding exercise design, conduct, and evaluation. Once implemented, EA will monitor corrective actions, as appropriate, and seek opportunities to evaluate future exercises and performance tests.

INDEPENDENT ASSESSMENT OF EMERGENCY MANAGEMENT AT THE IDAHO NATIONAL LABORATORY

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Emergency Management Assessments, within the independent Office of Enterprise Assessments (EA), assessed the emergency management program at the Idaho National Laboratory (INL). EA observed key decision-making venues during the annual exercise on October 12, 2021, to determine the effectiveness of the INL emergency response organization (ERO) response to an emergency. This assessment was conducted in accordance with the *Plan for the Independent Assessment of the Emergency Management Exercise at the Idaho National Laboratory, September – December 2021.*

The Idaho Operations Office (DOE-ID), within the Office of Nuclear Energy, provides Federal oversight of the INL emergency management program. Battelle Energy Alliance, LLC (BEA) is the prime contractor responsible for the site-level emergency management program. Spectra Tech, Inc. and Fluor Idaho, LLC operate other facilities at INL, but were not involved in the exercise and were not evaluated. This assessment only evaluated the effectiveness of DOE-ID and BEA in managing and maintaining ERO performance.

For the exercise, BEA chose a scenario from its emergency planning hazards assessment (EPHA). BEA simulated a vehicle accident that occurred while transporting irradiated reactor fuel from the Radioactive Scrap and Waste Facility to the Fuel Conditioning Facility within the Materials and Fuels Complex (MFC). The accident caused the fuel cask to overturn and release fission products, resulting in INL declaring a Site Area Emergency (SAE).

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which is implemented through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. This report uses the terms "best practices, deficiencies, findings, and opportunities for improvement (OFIs)" as defined in the order.

As identified in the assessment plan, this assessment considered requirements related to DOE Order 151.1D, *Comprehensive Emergency Management System*. EA also used the following sections of criteria and review approach document (CRAD), EA CRAD 33-09, Rev. 0, *DOE O 151.1D Emergency Management Program*: 4.4 Emergency Operations System, 4.6 Offsite Response Interface, 4.7 Emergency Categorization, 4.8 Protective Actions, 4.9 Consequence Assessment, 4.11 Notifications and Communications, and 4.15 Exercises. The assessment included the site's exercise critique and a review of BEA's after-action report (AAR).

EA examined key documents, including emergency plans and implementing procedures, the exercise plan, job aids, and other relevant programmatic documentation supporting the assessment of response elements. EA interviewed key personnel responsible for developing and executing the emergency management program and observed the conduct of the exercise and the initial evaluation activities, focusing on response processes and capabilities. EA further investigated potential causes of unexpected responses, such as insufficient training, ambiguous procedural guidance, or lack of drills to attain proficiency. Appendix A lists the members of the assessment team, the Quality Review Board, and EA management responsible for independent oversight assessments.

There were no previous findings for follow-up addressed during this assessment.

3.0 RESULTS

In response to the postulated incident, BEA activated the ERO, which included the MFC's emergency control center (ECC), central facilities area (CFA) ECC, the emergency operations center (EOC) located in Idaho Falls, and the joint information center (JIC) co-located with the EOC. The transportation building emergency director (BED) reported the incident to the MFC emergency action manager (EAM), who then reported the incident to the warning communication center (WCC) and the fire alarm and emergency dispatch center (FAEDC). The FAEDC and the WCC dispatched first responders, activated the ERO, and contacted the on-duty emergency director (ED). ERO members reported to their assigned positions and responded to the incident in accordance with their procedures and checklists. BEA procedures required the MFC EAM to classify the incident after receiving radio reports from the transportation BED in the field. Additionally, BEA partially simulated evacuation and accountability of the entire MFC facility. MFC workers exited the facility and boarded buses, which were dispatched to the facility's parking lot.

3.1 Emergency Classification

The objective of this portion of the assessment was to determine whether the predetermined decision-maker (MFC EAM) classified the incident as promptly as possible, but no later than 15 minutes after identification by the predetermined decision-maker and no more than 30 minutes from initial discovery.

The BEA MFC EAM correctly classified the incident using EPI-92, *MFC Operational Emergency Categorization/Classification and Protective Actions*, within 30 minutes of discovery. However, avoidable errors caused unnecessary delays in the incident classification. During the EAM's initial contact with the MFC transportation BED, the EAM learned of an accident involving a transport trailer with a cask on its side, with white smoke and popping and crackling noises coming from the cask. Twenty minutes after the initial call with the transportation BED, the EAM received additional emergency action level (EAL) entry information that the incident involved a cask containing Experimental Breeder Reactor II fuel pins from the Radioactive Scrap and Waste Facility.

Based on the new information, the EAM and ECC staff reviewed the MFC EALs, after initially having difficulty locating the MFC transportation EALs. Within three minutes of receiving the EAL entry information, the EAM classified the incident as an SAE based on EAL MFC-771-3.SAE.1. The EAM and ECC staff continued reviewing the EALs, verifying that the initial SAE classification was correct and, seven minutes later, updated the basis with the more applicable and more conservative transportation EAL TRN.ALL-3.SAE.7. Although BEA selected the correct EAL within the timeframe, classification could have been timelier if the transportation EALs were readily available. (See **OFI-BEA-1**.)

In accordance with EOC procedures, the BEA EOC support director (SD) reviewed EAL TRN.ALL-3.SAE.7 with the ED to verify and concur with the implemented EAL and the associated protective actions (PAs). The BEA EOC planning staff also verified and concurred with the incident classification and PAs.

Overall, BEA correctly and promptly classified the incident within 15 minutes of identification and within 30 minutes from initial discovery, however, BEA could improve the layout of the documentation to support faster incident classification.

3.2 Protective Actions

The objective of this portion of the assessment was to evaluate whether BEA responders correctly identified and implemented initial PAs, as well as predetermined onsite PAs.

The ERO immediately focused on protecting workers at the scene. The radiological controls (RadCon) supervisor and MFC EAM immediately recognized the potential for a release of radioactive materials based on elevated radiological readings and white smoke coming from the cask and directed personnel in the immediate area to evacuate in accordance with procedure LWP-15015, *Response to Abnormal Radiological Situations*. On-scene personnel evacuated to a location 2,300 feet west-southwest of the accident scene. Technicians supporting transport of the cask quickly confirmed that there was no contamination at their location.

MFC personnel effectively implemented emergency response functions to protect on-scene responders and implemented predetermined PAs. The MFC ECC was quickly staffed, and the MFC EAM appropriately decided to relocate to the alternate MFC ECC (an action stopped by controllers because it was outside the exercise scope), ensured that RadCon conducted contamination surveys of the ground and personnel, and directed the installation of continuous air monitoring equipment outside the building where the MFC ECC is located. The MFC EAM also relocated the incident command post (ICP) three times to increase the distance from the incident and, for the third relocation, to move all ICP personnel indoors. The MFC ECC and CFA ECC took prompt actions to secure road access into potentially affected areas. Predetermined PAs for the initial EAL required evacuation of personnel out to 1,575 feet, but once the on-scene personnel evacuated, no other personnel were in the evacuation area. As a precautionary measure, the MFC EAM also implemented a shelter-in-place PA for all MFC personnel. Once the second EAL was implemented, predetermined PAs required the MFC EAM to implement a full MFC evacuation. The MFC EAM then appropriately directed personnel to remain indoors while evacuation preparations were underway, based on guidance for phased evacuations in EPI-92. The CFA ECC effectively supported the evacuation by mobilizing additional buses at the CFA to the MFC. Accountability of evacuated workers occurred within 37 minutes of the time the evacuation was initiated. Finally, the EOC staff produced plume projections, corroborating that the initial PAs were adequate and that no offsite PA recommendations were necessary.

However, not all BEA's PA decisions minimized emergency-related consequences and maximized the safety and health for all workers and responders, as required by DOE Order 151.1D, attachment 3. BEA self-identified some of the issues; however, a combination of unclear lines of responsibility, lack of situational awareness, ineffective unified command, and inadequate procedures would have affected the health and safety of workers and potentially elevated exposures, as described below:

- The MFC EAM did not provide safe routing for evacuees. The MFC EAM sent MFC evacuees to the east gate, directly into the plume, resulting in unnecessary exposure if controllers had not redirected evacuation to the south. The MFC EAM never requested or received plume models produced by EOC assessment specialists to aid in evacuation planning. In addition, the MFC ECC did not use maps to help develop its evacuation plan. Maps available in the MFC ECC are not drawn to scale, and staff did not use other available planning tools, such as iMap®. In post-action interviews with the MFC staff, decision-makers stated that they would not have evacuated workers to the east if they had seen plume model projections before developing their plan. This issue was identified by the BEA evaluator organization as a weakness in its AAR. (See **OFI-BEA-2**.)
- The MFC ECC staff did not implement a shelter-in-place PA for 25 minutes even though decision-makers knew within two minutes that a potentially radioactive plume was blowing toward the facility. The excessive delay in determining and implementing PAs for MFC personnel potentially resulted in

unnecessary exposure. The third step in the MFC EAM's checklist, MFC-1, *Emergency Action Manager*, directs the consideration of precautionary PAs as appropriate, and offers EPI-92 as a reference. The MFC EAM eventually implemented a shelter-in-place PA as a precaution; however, this decision, while appropriate, was implemented approximately 20 minutes after he first reviewed the checklist step to consider precautionary PAs, and his decision was not based on guidance in any available procedures. (See **OFI-BEA-2**.)

- The MFC EAM and incident commander (IC), both members of unified command per the INL emergency plan, did not effectively share significant information about plume direction or locations of contamination detected by facility monitoring teams. As a result, the IC, who wanted an ICP location that would allow observation of the scene, relocated to the intersection of Taylor Boulevard and Buchanan, west of the MFC parking lot, without knowing whether the location was habitable. The IC was never informed that facility monitoring teams detected contamination near the facility's south entrance, or that winds were projected to shift slightly later in the morning, moving the plume even closer to the intersection of Taylor Boulevard and Buchanan. In addition, the RadCon supervisor, who believed the area was contaminated, said he advised the IC against the move and did not relocate with the IC to serve as his RadCon advisor or conduct radiological surveys. The RadCon supervisor stated in post-action interviews that his obligations to support the IC ended when the IC evacuated personnel from the immediate area and that the MFC EAM could have dispatched someone from the radiological response team to support the IC if he believed it was necessary. After relocating to Taylor Boulevard, the IC did not have any facility representative acting as a liaison to share information from the MFC EAM because the transportation BED evacuated on a bus, and the IC never contacted the MFC EAM to request a facility liaison or to request RadCon support to verify ICP habitability. (See **OFI-BEA-2**.)
- The predetermined PAs for both EALs used in the exercise (one for transportation and one for a fixed facility), as well as other transportation related EALs that EA reviewed during the assessment of the exercise, are not conservative. Evacuating the Protective Action Criteria (PAC)-2 area, versus only the Threshold for Early Lethality (TEL) area, is not considered conservative per DOE emergency management guides unless it can be accomplished prior to plume arrival, because it requires employees to leave shelter and enter a hazardous plume until they reach a safer location. During the exercise, the MFC EAM proactively minimized exposure by keeping personnel sheltered until buses arrived for evacuation. However, developing predetermined PAs that only evacuate the TEL area and require a shelter-in-place PA for employees in the PAC-2 area, with instructions to secure building ventilation, would implement a more conservative response that is consistent with DOE emergency management guides. (See **OFI-BEA-2**.)

Overall, BEA partially met this objective by immediately evacuating the incident scene area, securing road access into the impacted area, sheltering MFC workers, evacuating and accounting for evacuees, and validating PA and protective action recommendation decisions in the EOC. While implemented PAs were consistent with the predetermined PAs for both EALs used, the predetermined PAs for both EALs selected are not conservative. In addition, the planned movement of evacuees toward the plume, the 25-minute delay in issuing a precautionary shelter-in-place while searching for predetermined PAs, and the relocation of the ICP to the edge of the plume path are not effective in protecting personnel from a potential radioactive material uptake. A combination of unclear lines of responsibility, lack of situational awareness, ineffective unified command, and inadequate procedural guidance lessened the effectiveness of the response.

3.3 Notifications and Communications

The objective of this portion of the assessment was to determine whether BEA performed initial notifications promptly, accurately, and effectively, and whether the ERO maintained effective communications throughout the response.

3.3.1 Notifications

BEA effectively completed most required notifications, including promptly notifying MFC workers and the INL ERO. During the initial radio communication from the transportation BED to report the incident to the MFC EAM, the MFC EAM directed the immediate evacuation of the workers supporting the cask transport. In addition, the transportation BED notified the FAEDC who dispatched the fire department and provided the incident description and meteorological information. Also, the MFC EAM used the MFC public address speaker system to notify the MFC ERO staff located at MFC during the time of the incident and then contacted the WCC staff to activate the MFC ERO using Everbridge, an automated system delivering voice, text, and email messages. Furthermore, the MFC EAM used redundant communication systems (MFC speakers and sirens) at MFC to complete the prompt issuance of worker PAs, which were completed within a minute of initially classifying the incident, much less than the required time of 10 minutes. Finally, BEA appropriately completed the termination notification.

However, BEA did not complete the initial notification to other INL facilities and offsite agencies, including the required follow-up telephone call to the DOE Headquarters Watch Office. BEA used web-based Emergency Operation Center (WebEOC®) to generate the initial emergency notification form; however, the notification form process failed to function properly and did not automatically transmit the written notification. Recognizing a WebEOC® problem, the MFC support manager used the backup method and contacted the WCC staff to complete the initial notifications. Nevertheless, WCC staff did not complete the notification process, which BEA noted in its exercise AAR. Conversely, the MFC support manager informed the MFC EAM that notifications were complete. (See **OFI-BEA-3**.)

Also, the MFC ECC staff concluded that the WebEOC® malfunction caused the problem with the initial notification and chose to use a manual/facsimile method for the second notification. The MFC support manager developed a handwritten second notification shortly after the MFC EAM reclassified the incident and faxed the approved notification to the WCC for further distribution. However, the second notification form was not available to the ERO outside of the MFC ECC and WCC for over an hour. Consequently, BEA did not provide other INL facilities and offsite agencies the required notifications of the incident, which DOE Headquarters, state/local responders, and other INL facilities needed for situational awareness of the emergency conditions. BEA incorrectly anticipated WebEOC® to be reliable and that, if necessary, the backup process would successfully distribute notifications to other INL facilities and offsite agencies. Because BEA does not require the WCC staff to communicate the completion of the offsite notifications to the MFC EAM, the MFC EAM never received an updated notification status. EA primarily attributes the notification weaknesses between two distinct issues with WebEOC®. In the first, the MFC ECC user did not recognize that he was not authorized to enter the information and initiate the automated notification process in WebEOC® because BEA had not given him notification form access permission within the application. Consequently, BEA personnel assumed that the problem was not user related and was an issue with the WebEOC® system. In addition, an unrelated WebEOC® issue had occurred concurrently because BEA had transitioned to a cloud base application as discussed further in Section 3.6. (See **OFI-BEA-3**.)

In addition, BEA did not promptly notify site workers of PAs. For an SAE at MFC, a hazardous environment could exist in the area outside the MFC fenced facility, and the MFC EAM is responsible to notify the personnel (field workers) outside of MFC fenced facility boundaries of the PAs. Because the

field worker notification was independent of the MFC worker PA notification, it did not occur for 30 minutes after the MFC worker notification, and the MFC EAM was never informed of the situation. Consequently, BEA did not ensure the health and safety of field workers within the 10-minute requirement, which BEA self-identified in its exercise AAR. (See **OFI-BEA-4**.)

EA attributes the delay in field worker notification to the use of procedures that lack emergency operations system (EOS) concepts (centralized collection, validation, analysis, and coordination of information). BEA has not procedurally integrated the field worker PA notifications across the various ERO elements to ensure clear responsibility for actions and to ensure that the decision-maker receives feedback on actions completed by supporting elements to facilitate situational awareness. BEA assigns primary responsibility for field worker PA notifications for an MFC incident to the MFC EAM per EPI-92. However, EPI-92 does not provide the necessary details or reminders to successfully initiate the field worker PA notification process. EPI-92 contains references in only 2 of 52 MFC SAE EALs to remind the MFC EAM to notify field workers of PAs, and the MFC ECC checklists do not reference this responsibility. In addition, procedures do not clearly identify who alerts the CFA ECC staff to issue field worker notifications; once alerted, the CFA ECC staff must obtain a faxed copy of the field worker list controlled by the FAEDC and use Everbridge to perform a group notification to the field workers' points of contact, informing them to notify their field workers to take applicable PAs. (See **OFI-BEA-4**.)

3.3.2 Communications

BEA has adequate communications capabilities and maintains plans, procedures, and several interoperable systems to facilitate effective communications among ERO response elements, including radio, WebEOC®, and iMap®. During the exercise, response facility EROs appropriately conducted periodic briefings and discussed key decisions, including incident classification and PAs, prior to implementation. Notably, the MFC responders consistently maintained rigorous three-way radio communications (repeat back) and used the phrase "This is a drill." throughout the emergency response per EPI-83, *Communications*. However, as discussed in section 3.6, centralized collection, validation, analysis, and coordination of information among response components did not result in situational awareness and a common operating picture, including the confirmation of the two notifications discussed in section 3.3.1.

Overall, BEA has processes and systems for notifications and communications but did not always execute them effectively. BEA effectively completed most notifications, appropriately conducted intra-facility briefings, and discussed key decisions prior to implementation. However, BEA did not demonstrate effective communications, including feedback to decision-makers of task completion, between the various facilities ERO members, which negatively affected situational awareness and a common operating picture, as further discussed in section 3.6. Importantly, BEA did not provide field workers timely notification of PAs to ensure their safety and did not complete notifications to other INL facilities and offsite agencies or contact DOE Headquarters to inform them of the incident.

3.4 Consequence Assessment

The objective of this portion of the assessment was to evaluate whether BEA's consequence assessment activities provided a conservative timely initial assessment (TIA); accurate projections using incident conditions; and supportive assessments throughout the emergency.

The EOC planning director provided effective leadership within the EOC planning team, resulting in conservative and timely assessments. The planning director collected initial and subsequent incident data; ensured that assessment specialists reviewed the EAL and the EPHA; directed the EOC assessment

specialists to monitor weather forecasts, develop plume projections, and coordinate assessment results with the site monitoring team (SMT); and kept the ED informed of planning team activities.

The assessment specialists conducted a TIA by acquiring situational awareness regarding the incident and using the HotSpot dispersion modeling program, current meteorological conditions, and the worst-case source term mixture file. The assessment specialists also confirmed the incident classification and determined that the predetermined PAs were adequate to protect personnel from projected consequences. In addition, the assessment specialists performed conservative and supportive ongoing assessments using the National Atmospheric Release Advisory Center (NARAC) dispersion modeling program. Assessment specialists discussed modeling information with the NARAC staff via the phone on numerous occasions throughout the exercise. Both the initial and subsequent NARAC results projected that the implemented PAs extended beyond where the PAC of one rem total effective dose could occur.

The planning team conducted ongoing consequence assessment that incorporated facility and field indications and measurements. The EOC National Oceanic and Atmospheric Administration representative frequently reviewed the weather conditions for the affected area, provided updates to the planning team, and activated fixed high-volume air monitors upon report of a radiological release. In addition, the planning team effectively coordinated with the SMT through the SMT coordinator to initiate field monitoring activities to confirm the plume boundaries. The assessment specialists submitted field monitoring data to NARAC personnel to refine the dose projection.

The assessment specialists demonstrated the ability to conduct TIA and ongoing consequence assessment; however, the assessment specialists were not always proficient in their use of NARAC's modeling program and sharing plume projection information, which BEA self-identified in its evaluation and AAR.

- The assessment specialists used the HotSpot worst-case mixture file in NARAC but did not enter some release parameters (e.g., respirable fraction and damage ratio), resulting in a source term that was 33 times higher than the worst-case source term and an overestimate of the downwind consequences. The assessment specialists did not investigate the elevated consequences or recognize that they had used an incorrect source term. (See **OFI-BEA-5**.)
- The assessment specialists modeled the release from a location that did not match the location of the exercise incident. The first NARAC projection used the default location for MFC, approximately 1,000 feet east of the incident scene. The assessment specialists recognized the error and manually entered a release location closer to the actual location but still approximately 300 feet from the incident location. Consequently, the BEA consequence assessment resulted in an incorrect projection of the affected downwind area. (See **OFI-BEA-5**.)
- The ERO did not effectively discuss the administration of potassium iodide (KI) to workers; as a result, the MFC ECC wasted a significant amount of time determining that KI was unnecessary. The EOC assessment specialists appropriately determined that the thyroid projected dose did not require KI administration based on a NARAC projection showing the early phase thyroid committed dose equivalent of less than one rem. However, because the assessment specialists did not share the information, the RadCon director in the MFC ECC unnecessarily worked with technical specialists to determine that KI was not needed. Before making his recommendation to the MFC EAM, the RadCon director ordered field monitoring teams to conduct monitoring for iodine to support his decision. While the teams wore appropriate protective equipment, they spent unnecessary time in the plume monitoring for iodine. (See **OFI-BEA-6**.)
- The assessment specialists did not support dissemination of a common operating picture among response components. The planning team did not post the NARAC plume projections to WebEOC® or share them with the ERO members located in the MFC ECC. Standard practice for the INL EOC

is to not post plume projections due to the possibility of misinterpretation; consequently, the MFC ERO did not have critical information to support worker evacuation plans as discussed in section 3.2. (See **OFI-BEA-6**.)

Overall, the planning team's consequence assessment activities provided a conservative initial assessment and ongoing supportive assessments throughout the emergency. The assessment specialists validated the correct selection of incident classification and used HotSpot to conduct TIA. The assessment specialists coordinated with NARAC staff and, with a few exceptions, effectively used NARAC throughout the emergency to corroborate the HotSpot consequence assessment results. Also, the assessment specialists and the SMT coordinator integrated dispersion projections with field monitoring, and the assessment specialists submitted data to NARAC to refine the plume projection. However, some modeling errors occurred, and most notably, not sharing information with affected ERO organizations significantly diminished situational awareness and contributed to inappropriate decisions.

3.5 Offsite Interface

The objective of this portion of the assessment was to evaluate the effectiveness of BEA and DOE-ID in establishing and maintaining interfaces with local, state, and Federal organizations responsible for emergency response.

During the exercise, interfaces occurred between BEA and several offsite agency representatives, including the Idaho highway patrol and two representatives from the State of Idaho. One representative from the Idaho Department of Emergency Management and another from the Idaho Department of Environmental Quality (DEQ) responded to their assigned positions in the EOC. These two state representatives interacted with ERO staff in the JIC, which is also located in the EOC, and both representatives had ready access to the ED, EOC SD, and the EOC planning group. The Idaho DEQ representative requested the activation of INL's radiological assistance program team via the phone as designed in the exercise. NARAC also participated in the exercise, as noted in the previous section, and Radiation Emergency Assistance Center/Training Site assets consulted with EOC medical staff. BEA scheduled all other offsite authorities to participate in the exercise by receiving the initial notification; however, as already noted, BEA did not transmit the initial written notification form and did not provide an initial verbal briefing to DOE Headquarters. Finally, communications between the Idaho State Police and the WCC concerning control of state highway 20 were conducted directly via radio and were well executed.

However, interactions with offsite officials were limited and did not fulfill the five-year exercise plan's requirement for integration with state authorities. BEA's five-year exercise plan identifies evaluation criteria for offsite response interfaces as those listed in paragraph D.4.2 of DOE Guide 151.1-3, *Programmatic Elements Emergency Management Guide*. This paragraph lists 15 criteria for evaluating the offsite response interface, including briefing offsite officials upon activation, providing effective information exchange between the ERO and offsite personnel, directing incoming offsite agency inquiries to the appropriate personnel for resolution, and implementing provisions for coordinating with offsite agencies on the release of information about the emergency to the public. Other than a discussion with the JIC's Public Information Director about state representatives receiving initial activation information, a short conversation with the EOC SD, and very minor communications with the planning group, ERO members, including the DOE--ID management duty officer, did not interact with the state representatives. BEA or DOE-ID did not coordinate with any offsite authority over the release of public information about the incident. Additionally, the Idaho DEQ representative entered two requests for information in the WebEOC® significant events log, but these inquiries were not answered. As a result, BEA and DOE-ID did not effectively exercise the sharing of information with the State of Idaho which BEA self-identified. Despite the five-year exercise plan to use the annual exercise to fully integrate offsite officials into the

EOC, BEA and DOE-ID exercise planners made no plans to engage the Idaho representatives during the exercise. (See **OFI-DOE-1** and **OFI-BEA-7**.)

Overall, two representatives from the state participated in their assigned positions in the EOC. Also, NARAC, the Radiation Emergency Assistance Center/Training Site, and radiological assistance program members participated in their assigned capacities. However, BEA and DOE-ID did not plan for simulating the interface and demands required during an actual event and, therefore, did not fulfill the integration of the state representatives per the five-year exercise plan.

3.6 Emergency Operations System

The objective of this portion of the assessment was to determine whether the EOS provides centralized collection, validation, analysis, and coordination of information related to an INL incident response, and whether that information is used to obtain and maintain situational awareness and disseminate a common operating picture among response components to achieve a well-coordinated, well-understood, and effective response.

The BEA EOS had adequate capabilities to collect incident information and to provide needed expertise for incident analysis from centralized and well-equipped facilities and was consistent with the operational concepts of the National Incident Management System, which is the system mandated by Homeland Security Presidential Directive-5 that provides a consistent nationwide approach for domestic incidents. At the onset of the incident, the MFC ECC collected and disseminated response information, and the EOC became operational. Once operational, the ERO members within the EOC supplemented strategic management of the incident and supported the MFC EAM, allowing the MFC EAM to manage the MFC response without restrictions.

Nevertheless, the BEA ERO did not effectively implement an EOS that provided decision-makers with known information to achieve adequate situational awareness and a common operating picture. For example:

- MFC ECC staff did not capture some important incident information in WebEOC® or generate an iMap® graphic to maintain adequate situational awareness within the MFC ECC or with other response facilities, including the CFA ECC, EOC, and JIC. Consequently, fundamental information was not available or known by the ERO relative to the incident location, ICP locations, staging, access control points, personnel evacuation route, and data from radiological monitoring locations. (See **OFI-BEA-9**.)
- BEA did not post the plume projections to WebEOC® or share the information with MFC decision-makers. Consequently, the evacuation route determined by the MFC EAM was incorrect, and evacuation using the east gate would have unnecessarily exposed personnel to the release or material deposition, as indicated by the plume plots and discussed in section 3.2. (See **OFI-BEA-2**.)
- As previously discussed, the MFC ECC staff was unaware of the dose projection performed by the EOC assessment specialists. Consequently, the MFC ECC and EOC ED spent time analyzing whether to administer KI to the MFC evacuees, which the EOC assessment specialists had concluded was not necessary because of the low levels of iodine present in the fuel. (See **OFI-BEA-2** and **OFI-BEA-6**.)
- The MFC EAM was unaware that the CFA ECC did not complete timely field worker PA notifications, which is due to BEA not procedurally integrating the field worker PA notifications across the various ERO organizations to ensure that ERO teams have clear responsibility for actions,

as well as situational awareness and a common operating picture of actions completed by supporting teams. (See **OFI-BEA-4**.)

Furthermore, EA attributes some of the observations of EOS ineffectiveness during the exercise to BEA not incorporating all EOS requirements into the *INL Emergency Plan/Resource Conservation and Recovery Act (RCRA) Contingency Plan*. Consequently, there was inadequate flowdown of requirements for an effective EOS, as stated in DOE Order 151.1D, attachment 3, paragraph 4, and an unclear process for obtaining and maintaining situational awareness and disseminating a common operating picture among response components and external partners. (See **Finding F-BEA-1** and **OFI-BEA-8**.) The inadequate EOS resulted in decision-makers not having essential information to achieve acceptable situational awareness and a common operating picture, which adversely affected the key response elements of incident notification, PA decision-making, and consequence assessment.

In addition, EA observed a diminished performance of WebEOC®, which is the nexus of centralized collection, validation, analysis, and coordination of information among response components; this diminished performance adversely affected BEA's ability to maintain situational awareness and disseminate a common operating picture among the ERO. The unacceptable performance of WebEOC® was primarily caused by system configuration changes implemented in May 2021 related to cyber security concerns, which resulted in some users being unable to access the WebEOC® system and slowed data input and display for other users who could access WebEOC®. In 2012, based on lessons learned from the Fukushima nuclear accident, EA assessed numerous INL emergency response capabilities to ensure that critical functions were fully capable of standalone operation following the loss of critical infrastructure and documented that INL effectively maintained a reliable WebEOC® system configuration independent of the INL infrastructure. However, in 2021, the BEA Enterprise Architecture group concluded that redundant avenues to access WebEOC® in a "cloud" type configuration hosted on an outside server by another company would meet emergency management requirements. Consequently, BEA made significant changes to the WebEOC® server configuration and user access. By changing the WebEOC® configuration and introducing single points of failure, BEA weakened the reliability of its information management system and overall emergency management capability. Therefore, BEA has not maintained a capability independent of the INL network and firewall constraints that can operate in standalone mode, or independent of potential degradation of the INL site or commercial infrastructure, which previously existed. (See **Finding F-BEA-2** and **OFI-BEA-9**.) Reduced reliability of the information management system, because of WebEOC® network reconfiguration, reduced system access, adversely affected centralized collection, validation, analysis, and coordination of information among response components and diminished emergency responder performance. Furthermore, changes to the emergency management information network significantly contributed to two of the notification issues discussed in section 3.3.1.

Overall, the BEA EOS was consistent with the operational concepts of the National Incident Management System and had adequate capabilities to collect incident information and provide needed expertise for incident analysis from centralized and well-equipped facilities. However, BEA did not effectively implement its EOS and provide decision-makers with essential information to achieve acceptable situational awareness and a common operating picture. EA partially attributes some of the ineffective EOS to BEA not having incorporated all EOS requirements into the INL emergency plan. Consequently, there is inadequate flowdown of requirements for an effective EOS and an unclear process for obtaining and maintaining situational awareness and disseminating a common operating picture among response components and external partners. As discussed in previous sections of this report, performance issues also diminished the effectiveness of the overall EOS, especially in the key response elements of incident notification, PA decision-making, and consequence assessment. Lastly, the absence of a reliable information management system via WebEOC® due to network reconfiguration, as well as ineffective use

of WebEOC® by the ERO, further added to the problem. Collectively, the ERO did not have the necessary understanding of the incident to provide a fully effective response.

3.7 Exercise Design, Conduct, and Evaluation

The objective of this portion of the assessment was to evaluate the ability of the BEA exercise program to validate emergency response capabilities and test and validate emergency plans and procedures for hazards identified in the EPHA.

BEA appropriately designed and conducted this annual exercise to adequately test most selected response functions and validate associated plans and procedures. The exercise fulfilled most of the response elements and capabilities as defined in the five-year exercise plan and involved a scenario from the EPHA. BEA conducted a thorough pre-exercise safety briefing a day prior to the exercise and effectively managed the execution of the exercise despite severe winter weather the night prior to the exercise. Additionally, the use of actual weather during the exercise allowed RadCon technicians to respond to realistic field data from controllers accessing plume plots on portable computer pads. Finally, as a training opportunity, BEA allowed consequence assessment members to continue exercise play after the termination of the exercise so they could use field data to refine consequence assessment plans.

EA identified some concerns regarding exercise design, conduct, and evaluation. (See **OFI-BEA-10**.) Most notably, player hotwashes and the evaluator debriefing held following the exercise did not identify some performance issues. BEA identified some issues such as not transmitting the initial written notifications and not conducting the initial verbal notification to DOE Headquarters. However, BEA did not identify concerns with timely notification of PAs for field workers, the ineffective EOS, or ineffective centralized collection of information. Additionally, the exercise was marginally challenging and designer decisions to not evacuate the MFC ECC or execute the facility evacuation using actual weather nullified actual weather condition complexities and precluded testing those activities. Design and control issues prevented adequate exercise evaluation of the PA objective. For example, by not allowing employees to evacuate through the east gate as planned by the MFC ECC, evaluators were not able to determine whether the EOC would have reviewed and revised the plan. If employee contamination information had been issued for evacuees, the MFC ECC may have believed the intersection of Taylor Boulevard and Buchanan west of the MFC parking lot was contaminated (as field team controllers found in their projections) and taken action to stop the IC from relocating the ICP to that location.

Additional exercise performance weaknesses that were not identified by BEA include:

- Using the transportation BED as a trusted agent and thereby knowing the expected response.
- Briefing the transportation BED to evacuate on a bus rather than remain with the IC.
- Not providing an initial condition inject for the MFC EAM to review that describes the type of cask and transportation activity occurring, as normally provided in a plan-of-the-day briefing.
- Not providing an initial message inject with sufficient information to fully classify the incident.
- Providing a photo of the truck, trailer, and cask configured differently from the exercise scenario.
- Not planning to use the correct EAL for the scenario presented to the players.
- Not planning the simulation of the relocation center at CFA.
- Using an incident location different from the location described in the exercise plan.
- Pre-staging some EOC exercise players to artificially improve response times.

- Broadcasting the exercise controller radio net in the WCC, allowing players to anticipate coming events.

Overall, BEA appropriately designed and conducted this annual exercise to adequately test most selected response functions and validate associated plans and procedures. However, BEA's player hotwashes, evaluator critics, and AAR did not identify some issues such as timely notification of PAs for field workers, an ineffective EOS, or ineffective centralized collection of information. Additionally, the exercise was marginally challenging, and designer decisions to not evacuate the MFC ECC or execute the facility evacuation using actual weather nullified actual weather condition complexities and precluded testing those activities.

4.0 BEST PRACTICES

There were no best practices identified as part of this assessment.

5.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

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Finding F-BEA-1: BEA did not demonstrate an effective EOS that validates and coordinates incident information to establish and maintain situational awareness and a common operating picture among response components. (DOE Order 151.1D, attachment 3, paragraph 4)

Finding F-BEA-2: BEA did not demonstrate a reliable and effective information management system to support emergency response operations. (DOE Order 151.1D, attachment 3, paragraph 10)

6.0 DEFICIENCIES

There were no deficiencies identified as part of this assessment.

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified 11 OFIs to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

Battelle Energy Alliance, LLC

OFI-BEA-1: Consider improving human performance and helping decision-makers to quickly locate correct EALs by performing human factor reviews on the functional design of how EALs are cataloged.

OFI-BEA-2: Consider improving PAs for workers by:

- Installing properly scaled maps in the MFC ECC.
- Updating procedures and checklists to require the use of information management tools such as iMap®.
- Ensuring that plume models from the EOC are requested and made available to the MFC command staff.
- Improving EPI-92 by removing precautionary PA guidance from specific EALs and instead providing general guidance for keeping exposures as low as reasonably achievable. Consider revising EPI-92 and the MFC ECC EAM's checklist to direct decision-makers to immediately notify workers of any confirmed or potential hazardous material release and advise the affected workers to shelter-in-place as a precaution until additional direction is provided.
- Revising training as needed to indicate that precautionary PAs can and should be implemented before all the information necessary for final categorization and classification of a specific event is available.
- Updating MFC plans, procedures, checklists, and training to:
    - Require the EAM and IC to coordinate in defining the incident scene area that the IC is responsible for protecting.
    - Ensure that the IC, versus the EAM, is primarily responsible for the safety of personnel at the ICP and incident scene area.
    - Ensure that PAs for the ICP and incident scene are issued by the EAM as recommendations requiring IC approval.
    - Ensure that a RadCon supervisor and the transportation BED remain with, support, and take direction from the IC until released by the IC.
    - Ensure that immediate initial PA information based on industry standards is promptly shared by the IC with the EAM.
    - Ensure that the IC and MFC ECC share and discuss all significant information, including actions pertaining to PAs, responder safety, plume and contamination information, and key mitigation strategies/tactics.
- Developing a consistent strategy on how predetermined PAs are developed and written in EALs using the methodologies described in *Emergency Management Guides* associated with DOE Order 151.1D.

OFI-BEA-3: Consider improving the process of onsite facilities and offsite notifications by:

- Validating notification completion by the WCC staff to the originating facility EAM
- Incorporating the contact information for the onsite facilities into the Everbridge system
- Conducting drills and exercises to validate backup methods of notifications.

OFI-BEA-4: Consider improving the timely notification of field workers by:

- Defining the process, consistent with EOS concepts (centralized collection, validation, analysis, and coordination of information), for field worker notifications from the declaration of an SAE or General Emergency and identification of predetermined PAs by the affected facility EAM, through verification of receipt of notification by the field workers, to validating completion of the task to the original EAM.
- Validating field worker notification completion by the CFA EAM to the originating facility EAM.
- Shifting the responsibility for implementing field worker PA notifications to the WCC, which maintains the field worker notification information, with a validation of completion back to the originating facility EAM.

OFI-BEA-5: Consider improving the effectiveness of ongoing consequence assessments by:

- Reviewing assessment specialist training to ensure it includes the methodology, assumptions, inputs, and interpretation of NARAC plume projections.
- Preparing an assessment specialist procedure or operator aid for using NARAC during a response.

OFI-BEA-6: Consider promoting a shared situational awareness and common understanding of hazardous material releases among all response components by:

- Revising ERO training to provide key field responders the skills and ability to understand and interpret plume projections.
- Eliminating the standard practice for BEA to not post plume projections because of the possibility of misinterpretation and ensuring that assessment specialists provide adequate interpretation for all projections posted on WebEOC®.

OFI-BEA-7: Consider improving the integration and involvement of the State of Idaho representatives by:

- Coordinating closely with State of Idaho representatives during the annual exercise planning phase to develop exercise objectives, goals, and exercise injects for state representatives.
- Assigning BEA and/or state controllers and evaluators for state representatives.

OFI-BEA-8: Consider improving the EOS so that it provides a complete common operating picture and shared situational awareness during an emergency by:

- Analyzing the field operations and ERO information flow dynamics to define the critical paths of key information and to identify expected actions for achieving and maintaining situational awareness among all teams.
- Adapting an information flow structure that assigns specific responsibility for each key information set, including responsibility for verifying and validating essential incident information collected in WebEOC® or other response records.
- Establishing feedback loops back to the issuing decision-maker for key task completion, including offsite notifications, worker PA notification, accountability, and access control establishment.
- Incorporating guidance on the use of information management tools and resources to flow down requirements into the emergency plan, implementing procedures, and response checklists.

- Establishing a few additional WebEOC® status boards to collect and organize key information and help focus the EROs on a common operating picture, such as overall event strategy, PAs, and analysis of the hazards.
- Integrating incident management tools with other web-based geographical information systems to provide ERO personnel with views, data, and analysis tools for the site, the surrounding area, and interiors of many onsite buildings, including:
    - Meteorological monitoring data
    - Plume projections
    - Damage assessments
    - Field monitoring data
    - Site master planning data and engineering drawings (such as site drawings, utility drawings, and facility floor plans)
    - Facilities information management data.
- Automating the emergency public information approval process for public information officers by:
    - Coordinating a quick, consistent, factual message that contains relevant information
    - Integrating the use of social media as an additional means to answer, enhance, or verify information.
- Integrating WebEOC® with daily log keeping in the WCC, ultimately achieving automated log keeping, to improve proficiency in information management during an emergency.
- Consistently using iMap® for such functions as tracking responder locations, access controls, geographically mapping PA zones, and assessing facility damage.

OFI-BEA-9: Consider improving the reliability, availability, and maintainability of the emergency management information system by:

- Designating the WebEOC® emergency management information network a mission-critical system, that must be capable of operating in standalone mode, or independent of potential degradation of the INL site or commercial infrastructure.
- Defining the WebEOC® network where separation of data collection, storage, and processing is technically possible, but must not increase the delay in transmitting emergency information beyond a reasonable limit for emergency conditions.

OFI-BEA-10: Consider improving exercise design, conduct, and evaluation by:

- Developing a culture of conducting detailed and critical player hotwashes and evaluator debriefings to ensure identification of improvement items
- Minimizing the use of trusted agents during the development of the exercise
- Vetting and validating key exercise injects, such as initial injects for classification of incidents
- Conducting an exercise inject review by controllers from all involved venues, focusing on ensuring that injects cover required exercise inputs

- Ensuring that exercise players are not pre-staged near their exercise venues
- Not broadcasting the exercise controller radio network in the WCC.

Idaho Operations Office

OFI-DOE-1: Consider improving information sharing and integration with the State of Idaho officials by increasing interactions and integration with state representatives during the annual exercise.

Appendix A
Supplemental Information

Dates of Assessment

Onsite Assessment: September 21-23, October 11-14, November 2-4, 2021

Office of Enterprise Assessments (EA) Management

John E. Dupuy, Director, Office of Enterprise Assessments
William F. West, Deputy Director, Office of Enterprise Assessments
Kevin G. Kilp, Director, Office of Environment, Safety and Health Assessments
David A. Young, Deputy Director, Office of Environment, Safety and Health Assessments
Kevin M. Witt, Director, Office of Nuclear Safety and Environmental Assessments
Charles C. Kreager, Director, Office of Worker Safety and Health Assessments
Jack E. Winston, Director, Office of Emergency Management Assessments
Joseph J. Waring, Director, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

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Michael A. Kilpatrick

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